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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPLICANT(s):	Hamalainen et al.		
SERIAL NO.:	09/098,832	ART UNIT:	2665
FILING DATE:	06/17/1998	EXAMINER:	Phan, M.U.
TITLE:	TIME DIVISION MULTIPLE ACCESS RADIO SYSTEMS		
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Board of Patent Appeals and Interferences
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' BRIEF

This is an appeal from the final rejection of the claims in the above-identified application. A Notice of Appeal was mailed on March 9, 2005.

I. REAL PARTY IN INTEREST

The real party in interest in this Appeal is:

NOKIA CORPORATION

II. RELATED APPEALS AND INTERFERENCES

There are no directly related appeals or interferences regarding this application.

III. STATUS OF CLAIMS

Claims 1-10 are pending in the application.

Claims 1-10 have been finally rejected.

The claims on appeal are 1-10.

IV. STATUS OF AMENDMENTS

There are no outstanding amendments. All amendments and responses have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Applicant's invention is directed to a system for and a method of operating a time division multiple access (TDMA) radio system having multi-slot capabilities and utilising half-duplex transmission/reception. (page 2, lines 24-26) The uplink and downlink user data transmissions between a mobile station and a base station are made in TDMA frames, where the TDMA frames for uplink user data transmissions are separate from TDMA frames for downlink user data transmissions. (page 2, lines 26-28) A greater number of time slots are allocated in each downlink TDMA frame than in each uplink TDMA frame, to the mobile station. (page 2, lines 28-30). The TDMA frames alternate between reception and transmission frames. (page 4, line 15-24, FIG. 2).

The TDMA system can utilize the GPRS protocol or HSCSD protocol (page 3, lines 9-10).

In one embodiment, the invention is also directed to a time division multiple access (TDMA) radio system having multi-slot capabilities and utilising half-duplex transmission/reception where uplink and downlink user data transmissions between a mobile station (2) and a base station (3) are made in TDMA frames. (page 3, lines 15-18; page 4, lines 7-13; FIG. 1). The TDMA frames for uplink user data transmissions are separate from TDMA frames for downlink user data transmissions. (page 3, line 18-19; page 4, lines 15-18; FIG. 2). In one embodiment, the uplink TDMA frames and the downlink TDMA frames are not contiguous (page 4, lines 21-22). The system comprises control means for allocating a greater number of time slots in each downlink TDMA frame than in each uplink TDMA frame, to said mobile station (page 3, lines 19-21; page 4, lines 26-34; FIG. 2).

In another aspect, the present invention is directed to a mobile communication device arranged to operate in a time division multiple access (TDMA) radio system having multi-slot capabilities. (page 3, lines 23-25; page 4, lines 7-13). The mobile communication device comprising a radio module utilising half-duplex transmission/reception where uplink and downlink user data transmissions between the mobile communication device and a base station are made in TDMA frames. (page 3, lines 25-28; page 4, lines 15-24; FIG. 2). The TDMA frames for uplink user data transmissions are separate from TDMA frames for downlink user data transmissions and a greater number of time slots may be allocated in each downlink TDMA frame than in each

uplink TDMA frame, to the mobile communication device. (page 3, lines 28-30; page 4, lines 26-33; FIG. 2).

Figure 1 illustrates a cell 1 of a cellular mobile telephone network. A mobile station (or telephone) 2 located within the cell 1 communicates with a base station (BS) 3 of the cell. When a cell or data connection is made from the mobile station 2 to the BS 3 or *vice versa*, a downlink channel and an uplink channel are reserved to enable bi-directional communication to take place. Both of these channels are in the same frequency band and each consists of a plurality of time slots reserved in every other TDMA frame.

In Figure 2 the upper diagram illustrates the time slots (2 and 3) reserved for the uplink channel, i.e. for user data transmission from the MS 2 to the BSS 3, MS TX, and the lower diagram illustrates the time slots (3 to 6) reserved for the downlink channel, i.e. for user data reception by the MS 2, MS RX. The TDMA frames (TX and RX frames) of the uplink and downlink channels are interlaced so that the frames alternate between uplink and downlink channels. In this way, regardless of the number or location of slots reserved for either the uplink or downlink channels, the reserved slots will not overlap in time. The MS 2 can therefore be provided with a single radio module 4 which performs both transmission and reception functions.

The number of time slots reserved in any one TDMA frame for the downlink channel is generally greater than the number of channels reserved for the uplink. This represents a new multi-slot class for TDMA radio systems. In the example shown in Figure 2, two time slots are allocated to the MS 2 in each of

the uplink TDMA frames and four time slots are allocated in each of the downlink frames. Higher data transmission rates are generally required for the downlink than are required for the uplink. The asymmetry of time slot allocation tends to increase the efficiency of radio resource allocation and also results in power saving and other efficiencies in the MS 2.

VI. ISSUE TO BE REVIEWED ON APPEAL

1. Whether claims 1-2, and 5-7 are unpatentable over Crisler et al. ("Crisler") (U.S. Patent No. 5,594,738) in view of Dent (U.S. Patent No. 5,757,787) under 35 U.S.C. §103(a).

2. Whether claims 3-4, and 8-10 are unpatentable over Crisler et al. ("Crisler") (U.S. Patent No. 5,594,738) in view of Dent (U.S. Patent No. 5,757,787) and further in view of Galyas (U.S. Patent No. 6,205,157) under 35 U.S.C. §103(a).

VII. ARGUMENT

A. Rejection of claims 1-2 and 5-7 over Crisler and Dent.

Applicant's invention is not unpatentable over the combination of Crisler and Dent because there is no motivation in either of Crisler or Dent to combine them in the manner proposed, and the combination of Crisler and Dent does not disclose or suggest each feature of Applicant's invention as recited in the claims.

In order to establish a *prima facie* case of obviousness under 35 U.S.C. §103(a), there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or combine reference teachings. There must also be a reasonable expectation of success, and the

reference(s), when combined, must teach or suggest all of the claim limitations. (See M.P.E.P. §2142).

Neither Crisler nor Dent, and/or the knowledge generally available to one of skill in the art provides the requisite **motivation or suggestion** to modify the references as proposed for purposes of 35 U.S.C. §103(a). When "the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or suggestion appears in the reference". In re Rijckaert, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). The mere statement by the Examiner that the two references are "in the same field of endeavor" is not an indicator of a "teaching", "suggestion" or "motivation", and the Examiner does not indicate where any such suggestion or motivation appears in the references. At most, the statement may be an attempt to demonstrate that the references are "analogous" art, since references may be combined under 35 U.S.C. §103(a) **only if** the references are analogous art. However, even if the references are analogous, there must also be the requisite "motivation" to combine the references, for purposes of 35 U.S.C. §103(a). Being "analogous" does not establish "motivation" under 35 U.S.C. §103(a). The Examiner's statement does not provide the requisite "motivation" to combine reference teachings for purposes of 35 U.S.C. §103(a), and it is respectfully submitted that there neither Crisler nor Dent do or can provide any such teaching, suggestion or motivation to modify the references or combine reference teachings.

Additionally, the Examiner's proposition that Applicants' invention would be obvious as recited in the claims is not supported by the factual contents of Crisler and Dent. Crisler

relates to the utilization of symmetrical time slots in a TDMA system. Crisler teaches allocating time slots in a time division multiple access communication system (100) in a N:N fashion. The time slot allocator (101) transmits an allocation indication to the communication unit in each of N downlink time slots (110) corresponding to the N allocated uplink time slots (108). Applicant's invention, according to claim 1, recites **allocating a greater number of timeslots in each downlink frame than in each uplink frame,** a N:M correspondence.

As illustrated in FIG. 1 of Crisler, and described throughout its specification, the "time slot allocation" in Crisler is always N:N. The number of uplink time slots allocated always equals or corresponds to the number of allocated downlink time slots. (Col. 2, line 64 to Col. 3, line 21). Crisler is silent as to any other type of allocation, let alone an "asymmetrical", N:M allocation. The time slot allocator (101) of Crisler only transmits an allocation indication for an N:N allocation of downlink and uplink time slots. (Col. 3, line 25 et. seq.).

Thus, Crisler is only applicable for a N:N time slot allocation system. There is no teaching or suggestion in Crisler of an "asymmetrical" time slot allocation system and one of skill in the art would not find any teaching or suggestion in Crisler that would lead one to develop an "asymmetrical" time slot allocation system as is claimed by Applicant.

Dent is related to a dual-mode terminal and deals with combining the two separate systems into an operational entity. Dent does not address "time slot" allocation as claimed by Applicant. Rather, Dent only addresses changing the "format" of a time slot, i.e. the "length" of a TDMA frame. In Dent, "the

invention comprises instead transmitting the same number of bits per slot but increasing the TDMA frame period by increasing the number of slots." (Col. 6, lines 35-38). While Dent may teach increasing the number of slots in a frame, Dent does not provide any teaching related to transmitting more time slots in one direction than in the other direction as is done in Applicant's invention (Col. 6, lines 54-55). Thus, in Dent, although the length of the TDMA frame change, Dent does not disclose or suggest a change in the allocation of uplink and downlink time slots, let alone allocating a greater number of time slots in each downlink direction than in each uplink direction.

This is clearly illustrated in FIG. 6 of Dent. FIG. 6 of Dent illustrates the correspondence between uplink and downlink frequencies and time slots. FIG. 6 illustrates four (4) time slots on each of the four (4) 50Khz channels in the uplink, for a total of 16 time slots. The figure also shows 16 time slots on a single (1) 200Khz downlink channel. (Col. 15, lines 39-44). FIG. 6 clearly shows a 1:1 correspondence of the uplink and downlink time slot allocation. Sixteen in one direction and sixteen in the other. Dent merely addresses the "size" of a "frame". Dent does not disclose or suggest in this figure or anywhere else, an "asymmetrical" allocation of time slots that is the subject of Applicant's invention. Thus, there is no "motivation" in Dent that would lead one of skill in the art to achieve the "asymmetrical" time slot allocation system of Applicant's invention.

Since neither Crisler nor Dent provide any teaching or suggestion related or directed to an "asymmetrical" time slot allocation system, there is no "motivation", as required for

purposes of 35 U.S.C. §103(a), that would lead one of skill in the art to make the proposed combination. Any suggestion to that effect could only be with "hindsight" knowledge of Applicant's invention, which is impermissible. At most, the motivation to combine Crisler and Dent would be to achieve a TDMA system in which the allocation is N:N and the time between slots is increased in order to reduce the average period. (Dent. Col. 6, lines 35-37). The combination could produce a GSM system that would allocate time slots in a symmetrical fashion, but could also allow for modification of the length of a time slot, from, for example, 8 time slots to 16, 24 or 32 time slots. However, the combination of Crisler and Dent would not produce a system in which a greater number of time slots are allocated in each downlink frame than in each uplink frame, as is claimed by Applicant.

Thus, a *prima facie* case of obviousness cannot be established since the requisite "motivation" to combine Crisler and Dent is not present.

Additionally, the combination Crisler and Dent does not disclose or suggest each feature of Applicant's invention as recited in claims 1-2 and 5-7. Claim 1 recites **"allocating a greater number of time slots in each downlink TDMA frame than in each uplink TDMA frame."** This is not disclosed or suggested by Crisler and Dent.

As previously stated, and also noted by the Examiner, Crisler is directed to a "symmetric" allocation of uplink time slots and downlink time slots, i.e. N:N allocation. Crisler does not disclose or suggest any "asymmetrical" time slot allocation as

is claimed by Applicant. Dent does not overcome at least this deficiency of Crisler.

Dent is directed to the "format" of a frame and not time slot "allocation", as is claimed by Applicant. In Dent, it is the "length" of the frame that is adjusted. As noted in Dent, each TDMA frame lasts approximately 4.615 mS and each TDMA frame 20 is divided into 8 timeslots 22. (Col. 5, lines 31-32). Different mobiles use different time slots. (Col. 5, lines 32-35) and each slot has an internal structure of data symbols. (Col. 5, lines 35-36.) Dent is directed to "increasing the time between slots to reduce the average bitrate, i.e. to increase the TDMA frame period by increasing the number of slots. (Col. 6, lines 35-38.) Nowhere does Dent disclose or suggest one number of time slots in one direction and a different number of time slots in the other direction, or **allocating a greater number of time slots in each downlink TDMA frame than in each uplink TDMA frame** as is claimed by Applicant. Dent merely discloses an increase in the number of slots in the frame (Col. 6, lines 54-55).

As noted, FIG. 6 of Dent illustrates the different "format" of the time slots, but still with a 1:1 allocation in the uplink and downlink channels. For example, in the uplink, Dent describes four 50kHz channels, each having 4 time slots for total of 16 time slots. In the downlink, Dent describes a single 200kHz downlink channel that also has 16 time slots. Thus, the uplink and downlink allocation is the same. In Applicant's invention, the allocation is different.

Dent only speaks to the **size** of a slot, for example 4, 8, 16 or 32 slot modes. (Col. 15, lines 48-60). However, Dent always

maintains a 1:1 correspondence of time slots between the uplink and the downlink channels. (Col. 15, line 43). Thus, as shown in FIG. 6 and described in, for example Col. 15, lines 39-60, the uplink channel is composed of 16 time slots and the downlink channel is also composed of 16 time slots.

While the Examiner makes the statement, on page 4 of the Office Action dated December 16, 2004, that "usually *more time slots are allocated asymmetrically to the downlink that to the uplink,* there is no support for such an assertion in either of Crisler or Dent or the combination thereof. The example cited by the Examiner following this statement is an example of 1:1 time slot allocation, i.e. 16 time slots (8 uplink and 8 downlink). None of the examples support any type of "asymmetric" allocation as claimed by Applicant. Dent illustrates a "symmetrical", N:N, allocation of time slots in the uplink and the downlink directions. Dent does not teach an "asymmetrical" **allocation** of time slots as is claimed by Applicant. Thus, this feature of Applicant's invention is not taught by the combination of references.

Furthermore, while the Examiner states that the "frame-based" approach allows TDMA communication channels to be configured to have either symmetric or asymmetric uplink/downlink bandwidths, or that channel bandwidth asymmetry can be configured alternatively in favor of uplink transmission or in favor of downlink transmission, neither Crisler nor Dent, or the combination thereof, disclose, suggest or even support this assertion. There is no teaching in either of the cited references related to the allocation of more time slots in one direction than in the other direction. Thus, the combination of

Crisler and Dent does not disclose or suggest each feature of Applicant's invention as claimed. Therefore, claims 1-2 and 5-7 are not obvious over Crisler and Dent under 35 U.S.C. §103(a) and should be allowable.

B. Rejection of claim 3-4 and 8-10 over Crisler, Dent and Galyas.

Claims 3-4 and 8-10 should at least be allowable in view of their respective dependencies for the above-stated reasons.

A check in the amount of $500 is enclosed herewith for the appeal brief fee. The Commissioner is hereby authorized to charge payment for any additional fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,

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VIII. CLAIM APPENDIX

The texts of the claims involved in the appeal are:

1. A method of operating a time division multiple access (TDMA) radio system having multi-slot capabilities and utilising half-duplex transmission/reception where uplink and downlink user data transmissions between a mobile station and a base station are made in TDMA frames, wherein TDMA frames for uplink user data transmissions are separate from TDMA frames for downlink user data transmissions, the method comprising allocating a greater number of time slots in each downlink TDMA frame than in each uplink TDMA frame, to said mobile station.

2. A method according to claim 1, wherein the TDMA frames alternate between reception and transmission frames.

3. A method according to claim 1, wherein the TDMA radio system utilises the GPRS protocol.

4. A method according to claim 1, wherein the TDMA radio system utilises the HSCSD protocol.

5. A time division multiple access (TDMA) radio system having multi-slot capabilities and utilising half-duplex transmission/reception where uplink and downlink user data transmissions between a mobile station and a base station are made

in TDMA frames, wherein TDMA frames for uplink user data transmissions are separate from TDMA frames for downlink user data transmissions, the system comprising control means for allocating a greater number of time slots in each downlink TDMA frame than in each uplink TDMA frame, to said mobile station.

6. A mobile communication device arranged to operate in a time division multiple access (TDMA) radio system having multi-slot capabilities, the mobile communication device comprising a radio module utilising half-duplex transmission/reception where uplink and downlink user data transmissions between the mobile communication device and a base station are made in TDMA frames, wherein TDMA frames for uplink user data transmissions are separate from TDMA frames for downlink user data transmissions, wherein a greater number of time slots may be allocated in each downlink TDMA frame than in each uplink TDMA frame, to the mobile communication device.

7. A mobile communication device according to claim 6, wherein the TDMA frames alternate between reception and transmission frames.

8. A mobile communication device according to claim 6, wherein the TDMA radio system utilises the GPRS protocol.

9. A mobile communication device according to claim 6, wherein the TDMA radio system utilises the HSCSD protocol.

10. The method of claim 1 wherein the uplink TDMA frames and the downlink TDMA frames are not contiguous.

IX. EVIDENCE APPENDIX

N/A

X. RELATED PROCEEDINGS APPENDIX

N/A